1: Jochelson E-5 (1900-01) 1908 RY4 Koryak RY4

133 Gishiga Bay, or, as they are locally called, the "larger and smaller waters," alternate regularly every two weeks.

The tides move with a rapidity of from one and a half to two and a half miles per hour, reaching a height of from four to eight metres. According to Slunin's data,[1] the tides of Penshina Bay have a still greater force and height. At the mouth of the Penshina River the tide reaches a velocity of seven miles per hour, and a height of from seven to ten metres. In the village of Kamenskoye I could see the tide crashing through the ice near the shore, and driving it into the mouth of the Penshina River. Enormous blocks of ice were piling up on each other, and wearing away the steep and rocky shore upon which the village is situated. At the mouth of the Tighil River the tide sometimes rises to a height of from five to seven metres. The height of the tide evidently depends upon the degree of exposure of a certain point. Near Okhotsk, for instance, where the sea is quite open, the tide does not rise higher than from two and a half to four metres.

Owing to the rolling surface of the country and to the absence of vast plains, the lakes in that region, in spite of the abundance of tundra spaces, are exceedingly limited in number as well as in size. In this respect the Koryak region differs strikingly from the vast plain of the Kolyma tundra, which contains thousands of lakes connected with each other by small rivulets. [361] These lakes abound in fish, rendering them attractive to the settled population of the northern Yakut as well as to the nomadic Yukaghir. The rapidity of the rivers, and the small number of lakes, may offer an explanation of the absence of a settled population in the interior of the Koryak territory.

[136] Of the lakes of the Gishiga tundra of more or less considerable size, I mention here the Kharitonovskoye, Chukchee (Chukotskoye), Ankudin (Ankudinovskoye), and Paren (Parenskoye) Lakes. They are said to abound in pike and crucian-carp.[2] However, none of the inhabitants of that region ever think of catching them. Some small lakes in which rivers take their rise are situated in the mountain-valleys. The largest lakes in northern Kamchatka are Lake Pallan, from which Pallan River rises, and Great Lake, in the Parapol tundra, forming the source of a tributary of the Talovka River.

● 132 CLIMATE. — In the entire vast country of the Koryak, meteorological observations, so far, are carried on in one place only, the Gishiginsk settlement (and this regularly, only since 1901), it being a second-class meteorological branch station of the principal physical observatory of St. Petersburg. However, from the fragmentary observations of travellers, among them the observations of the author during his travels over the country, the conclusion may be drawn that the climate of the interior is somewhat more severe than it is on the strip of land near the shore where Gishiginsk is situated, and

[1] Slunin, I, p. 147. [2] See Slunin, I, p. 560.

1: Jochelson E-5 (1900-01) 1908 RY4 Koryak RY4

132

that the moderating influence of Bering Sea upon the climate of the eastern shore is somewhat stronger than that exercised by Okhotsk Sea and its bays upon the climate of the coasts adjoining them.

Since the country of the Koryak extends from about the 56° of north latitude to the 64°,[1] the geographical position of certain points exercises some influence over their climate. However, the difference in the climate of the various places is not considerable. So far as the short series of available observations goes to show, it seems that a greater or less amount of humidity, or a greater or less severity of winter, results in a difference of about two degrees between the yearly averages of temperature of various points.

I will cite here, from reports of the principal physical observatory of St. Petersburg, data concerning the mean annual and monthly temperatures, according to observations at the Gishiginsk station, for 1901 and 1902, the temperature being given in Centigrade degrees.[2]

	1901.	1902.
January	—26.0	—22.8
February	—22.1	—27.6
March	—16.2	—17.9
April	— 4.4	— 9.6
May	1.7	0.1
June	7.8	9.4
July	13.2	12.1
August	12.0	10.6
September	4.0	3.0
October	— 4.5	—11.1
November	—14.1	—19.1
December	—14.9	—23.8
Mean annual temperature	— 5.2	— 8.0

According to further information furnished by the Gishiginsk station, the maximum temperature for 1901 was 25.1 C°. (VII. 7), and the minimum, −42.0° (II. 5). The first frost in 1901 took place Aug. 24; there are no data as to when it took place in 1902. The last frost in 1901 occurred on June 6; in 1902, on May 29. The first snow in 1901 fell on Sept. 27; in 1902, on Aug. 27. The last snow in 1901 fell on May 19; in 1902, on May 25. In 1902 the Gishiga River froze up on Oct. 15, and the ice in the river broke up on May 9. During my travels in the winter of 1900–01, the severest frost I experienced (−41.5° C.) was in Paren, on Jan. 26. The mean annual temperature of the coast of Bering Sea is −4°.[3]

If we compare the Koryak country with other maritime countries of the

[1] See Part I, map.

[2] The observations of this station prior to 1901 being incomplete, it is impossible to find the mean annual temperature.

[3] See Atlas climatologique de l'Empire de Russie publié par l'Observatoire Physique Central Nicolas à l'occasion du cinquantième anniversaire de sa fondation, 1849–99 (St. Petersburg, 1900).

1: Jochelson E-5 (1900-01) 1908 RY4 Koryak RY4

132 same latitude, we see that in the severity of its climate, which justly may be called arctic, it outranks them all. In no other place of a corresponding latitude, except Labrador, do we find such a low mean annual temperature on the seacoast. The climatic conditions on the east coast of America are determined by similar geographical conditions, to which is added the influence of the cold arctic current which skirts the coast of Labrador. Points lying north even of Gishiginsk (situated in 61° 55′ north latitude) enjoy a higher mean annual temperature than the latter. Reykjavik in Iceland, for instance (64° 8′ north latitude), has a mean annual temperature of 4.1°. Archangel (64° 32′ north latitude), situated 2° 37′ farther north than Gishiginsk, has a mean annual temperature of 0.4°. This is explained by the influence of other unfavorable climatological factors, such as cold currents, the presence of ice in the sea late in the summer, the influence of cold northern winds, and air-currents from the western quarter; that is, from the Yakutsk-Kolyma side. However, as compared with the cold continental climate of the latter, the climate of the Gishiga region is considerably less severe. This is due to its position near the sea, as well as to the protection from cold winds afforded to some extent by the Stanovoi Ridge, west of which are observed the lowest mean annual temperatures on the surface of the globe. The mean annual temperature, calculated for a number of years, was found to be −11.0° C. at Yakutsk, −12.4° C. at Sredne-Kolymsk, and −16.9° C. at Verkhoyansk.[1]

The maritime character of the climate of the Koryak country is to some extent made still more manifest by the comparison of data showing the difference between the highest summer and the lowest winter temperatures. The annual amplitude was, for Yakutsk (in 1901), 92.3° (summer maximum, 33.6°; winter minimum, −58.7°[2]); for Verkhoyansk (in 1899), 103.5° C. (summer maximum, 33.7°; winter minimum, −69.8°[3]); while for Gishiginsk it was (in 1901) 67.1° (summer maximum, 25.1°; winter minimum, −42.0°).

Judging from data collected for Gishiginsk, the amount of rainfall is insignificant for a country situated near the sea. The annual rainfall in 1901 amounted to 218.2 mm., and in 1902 to 283 mm. The amount of rainfall is thus distributed by months: —

	1901.	1902.
January	2.2 mm.	39.7 mm.
February	19.0 "	8.3 "
March	4.1 "	26.2 "
April	10.3 "	11.1 "
May	2.8 "	7.9 "
June	14.4 "	11.4 "

[1] Reports of the Department of Physical Geography of the University of St. Petersburg (St. Petersburg, 1899), Vol. I, p. 20 (Russian).

[2] Annals of the Principal Physical Observatory in St. Petersburg, 1901.

[3] Voyeikov, The Coldest Places on the Globe (Meteorological Messenger, St. Petersburg, 1897, No 8, p. 2 [Russian]).

1: Jochelson E-5 (1900-01) 1908 RY4 Koryak RY4

132

	1901.	1902.
July	8.3 mm.	21.0 mm.
August	9.1 "	69.2 "
September	26.9 "	58.6 "
October	45.4 "	17.7 "
November	45.2 "	1.4 "
December	30.5 "	10.4 "
Total for the year	218.2 mm.	282.9 mm.

In 1901 there were 52 days of snow and 26 days of rain, and but 42 days of fine weather were recorded. In 1902 there were 62 days of snow and 28 days of rain. But the amount of humidity and the almost constant cloudiness point to the maritime nature of the climate of that country. I will cite here some observations made by me during my travels, which may give some idea of the difference in the amount of humidity in the atmosphere between places east and west of the Stanovoi Ridge.

On leaving Gishiga in summer (in the month of August, 1901), on my way to the Kolyma River, I had, among other provisions, dried fish and rye biscuits packed in seal-skin bags, which are moisture-proof. On the third day I was compelled to throw out almost all the fish, and about half of the biscuits were covered with mould. On the contrary, up the Kolyma River dried fish kept well for weeks in my bags, and the rye biscuits became even dryer than they had been before.

The following fact is still more interesting. Leaf-tobacco, for exchange and for presents, had been purchased for the Expedition in Russia by the Irkutsk firm of Anna Ivanovna Gromov.[1] It was shipped in boxes by sea from Odessa to Vladivostok. In July, 1900, on leaving Vladivostok for Gishiga, I took the tobacco along with me on the steamer. Part of it I left in Ola Bay, whence it was sent directly to Verkhne-Kolymsk. The rest I took along to Gishiga. In the spring of 1901 I weighed the remainder of the tobacco, which was kept packed in its original case in the Government warehouse. The leaves proved to be moist; and to each pud of weight, according to the original invoice, there were found three pounds and a half (Russian) additional weight.[2] In October of the same year I arrived at Verkhne-Kolymsk, and, upon opening the boxes of tobacco sent from Ola, I found the leaves to

[1] I avail myself of this opportunity to express my gratitude to Mrs. A. I. Gromov, and her son-in-law Mitrophan Vasilievich Pakhtin, the manager of the firm, for the help and gratuitous services rendered by them to the Siberian section of the Expedition. The firm of A. I. Gromov is the largest in East Siberia dealing in furs, and supplying the districts along the Lena River with European wares. It has its own steamer-line. Mrs. A. I. Gromov rendered valuable services to many polar expeditions. She sent her steamer "Lena," the former auxiliary vessel of the steamer "Vega" of Nordenskiöld's Polar Expedition, in search of Baron Toll. Many ethnographical works on Siberia have been published at the expense of Mrs. Gromov; the large work on the Yakut, by V. Shternberg being one of them.

[2] Forty Russian ℔ or 36.01 English pounds, pounds, constitute one pud.

1: Jochelson E-5 (1900-01) 1908 RY4 Koryak RY4

● 132 be perfectly dry, and to every pud of its original weight there was found a shortage of four Russian pounds.

The following table will give an idea of the changes of the barometric pressure in Gishiginsk in 1901–02, according to the records of the Gishiginsk Meteorological Station.

	1901.			1902.		
	Average	Max.	Min.	Average	Max.	Min.
January	759.5	769.0	742.3	754.1	764.3	741.9
February	62.9	84.2	39.2	56.3	65.0	37.6
March	62.3	72.3	52.7	57.7	67.2	40.8
April	62.4	76.9	43.7	56.5	76.2	31.3
May	61.6	73.5	51.5	55.8	63.8	39.6
June	57.4	67.8	49.4	56.7	61.2	51.0
July	54.5	66.0	45.9	54.4	59.1	48.0
August	55.0	62.2	49.5	54.8	64.6	49.0
September	54.5	62.5	28.0	53.0	61.7	37.2
October	56.5	71.2	35.0	52.7	62.8	35.6
November	53.5	67.0	30.2	52.6	66.7	37.4
December	54.5	74.5	27.3	57.7	77.0	25.8
Entire year	757.9	784.2	727.3	755.2	777.0	725.8

We see from this table that Gishiginsk is outside the sphere of the anti-cyclone of northeastern Siberia, west of the Stanovoi Ridge, where we observe a regular winter maximum and a summer minimum. In general, a higher pressure is observed here during the spring months, beginning as early as February, when the weather is settled and is more or less quiet; and a lower pressure is observed in the fall and first winter months, when the greatest number of snow-storms occurs. However, a sudden change of pressure, depending upon the main winds, may occur at any time of the year.

According to the observations of the Gishiginsk station during 1901,[1] the winds are as follows: north, 324 times; northeast, 268; south, 94; southwest, 91; northwest, 46; east, 17; southeast, 11; west, 7; and calms, 196.[2] As will be seen, the greatest number of winds falls to the northern

[1] These observations are not complete for all the months of the years preceding 1901. For 1902 the observations were taken three times a day.

[2] Annals of the Principal Physical Observatory of St. Petersburg, 1901.

1: Jochelson E-5 (1900-01) 1908 RY4 Koryak RY4

quarter. The winds from the northern and western quarters — that is, those blowing from the Arctic Ocean and the Stanovoi Ridge — bring cold, and those from the east and south bring warmth. A sudden change in the winter, in the winds from one of these two directions, may cause a very low temperature, followed by thawing weather, and *vice versâ*. A sudden rise in temperature is accompanied by a strong wind, a penetrating damp fog, melting ice, or by a fine drizzling rain. The dampness penetrates everywhere; the clothing is wet through and through, and sticks to the body. But instantaneously a cold wind rises, and the wet straightway changes to frost. The clothing, heavy with moisture, quickly stiffens, turning to an icy coating, which cuts the body mercilessly. Woe to the traveller overtaken by such weather away from human habitation, or in an open tundra without wood for a fire! I was told that oftentimes people overtaken in the desert by such sudden changes of wind had been frozen to death. We ourselves, in our travels, were twice overtaken by sudden thaws, but fortunately in each case we were not far from dwellings.

My own observations, covering a period of about three months (from November to January, 1900–01) in Kamenskoye, at the mouth of Penshina River, show prevailing northeasterly winds, and thirty, out of a hundred observations, followed by a rise in temperature. Eastern winds, in most cases, also brought warmth. This was accompanied by a considerable fall of barometric pressure and by snow-storms. For instance, Nov. 7, 1900, the temperature in the morning was 21.5° C. (mimimum for the night, −24° C.), the wind was southwest, the barometric pressure, 766 mm. In the daytime of the 8th the temperature was 1.6°, the wind northeast, barometric pressure 745 mm., and it was raining. On the morning of Nov. 12 the temperature was −16.5° (minimum for the night, −23.5°), pressure 749 mm., wind northeast with a velocity of 8.1 metres per second. In the evening of the same day the temperature was −7.6°, barometric pressure 739 mm., wind east, and a storm with a wind-velocity of 18.6 metres per second; while on the morning of the 13th the temperature was 3.8°, the pressure 735 mm., wind east with a velocity of 10.8 metres per second, and it was raining. On the morning of Nov. 18 the temperature was −5.2° (minimum of the night, −11.5°), pressure 755 mm., wind northeast with a velocity of 5.8 metres per second. In the evening of the same day the temperature was 0.5°, the pressure 745 mm., wind northeast with a velocity of 18 metres; while on the morning of the 19th the temperature was 0.2° (night minimum, 0.2° as well), barometric pressure 737 mm., wind northeast with a velocity of 21.3 metres per second, that is, 47.5 miles per hour.

On the other hand, according to my own observations, on the very coldest days of the winter of 1900–01, which I spent in the villages of Kuel (the 24th) and Paren (the 25th and 26th), on the shores of Penshina Bay the

1: Jochelson E-5 (1900-01) 1908 RY4 Koryak RY4

132 wind was blowing from the western quarter, the barometric pressure was 761–762 mm., the velocity of the wind was only from 0.2 to 3 metres per second, and the temperature ranged from – 40° to – 41.5°. As mentioned above, the snow-storms are accompanied by a great and sudden rise of temperature. But there were a number of stormy days in January, in Kamenskoyè, with a very low temperature and the wind north-northeast. For instance, Jan. 17 — with the thermometer at – 21° (night minimum, –37°), wind north-northeast, a pressure of 745 mm. — the anemometer showed a wind-velocity of 20.2 metres per second.[1] On such days no clothing, no matter of what kind, is any protection from the cold. Woe to the person who is on the road at such a time! Snow-flakes as fine as sand and as hard as crystals whirl and whizz through the air, creep up under the clothes, blind the eyes, and cut the face. The hands and the entire body grow rapidly stiff, and in a long-continued struggle against the unceasing onslaughts of the wind one finally succumbs. Not a thing can be seen around, since the air is thick with snow.

When, on such days, I went to make observations at my station (which was only a few metres distant from the house), I should have soon lost my way and been unable to find my house, without the assistance of the cossack or interpreter. On days when snow-storms raged with extreme violence, not less than three of us would venture out together, for it was very easy to be thrown down by the wind, and buried under the snow, in the very midst of a settlement. Not only women, but even men, do not leave the house during very violent storms. When a snow-storm begins to rage, the dogs are let loose in order to give them freedom to find a sheltered place for themselves in their struggle against the weather. They lie down huddled together, and do not move until the falling snow makes breathing difficult. Then they get up, shake off the snow, and lie down again. In this struggle with the storm the dogs get so tired out that they lie motionless for an entire day after the storm has passed over. Dogs which are left tied perish oftentimes. When Mr. Bogoras came from Markova to visit us at Kamenskoye, in November, his driver left his dogs tied near my house over night. On the following morning the dogs had to be dug out from under the snow, and one of them was smothered. The wind-velocity, according to the anemometer, was then only 3.5 metres per second.

How frequently snow-storms occur during the first winter months may be judged (at least for 1900–01) from the fact that during my sojourn in Kamenskoye in November and December, 1900, and part of January, 1901, there were twenty-five days with a wind-velocity of from 10 to 21.3 metres per second. I settled down there in a small log-cabin belonging to a resident

[1] However, on Jan. 16 the temperature was –34° C. (night minimum, –37.5°), pressure 761 mm., wind northeast with a velocity of 4.5 metres per second.

1: Jochelson E-5 (1900-01) 1908 R14 Koryak R14

cossack. On mornings after a strong wind had been blowing at night, the hut would be found covered up to the roof with snow, so that we were unable to get out, and the Koryak would come to shovel off the snow and dig us out. 132

The bays of Okhotsk Sea, as well as those of Bering Sea near the Koryak shores, remain open in winter. Only the northern part of Gishiga Bay freezes up for a distance of from ten to fifteen miles from the shore. As late as May 10, 1901, I succeeded in driving on dog-sledges across the sea-ice from the mouth of the Chaibuga River to the small Russian settlement Kushka, at the mouth of the Gishiga, since, owing to the rising of the mountain-streams and the melting of the snow, it was impossible to go to that place direct by land. However, in Penshina Bay and on Bering Sea, only small narrow bays and a narrow strip along the shore freeze up; and in the course of the winter, even this strip of ice often gives way to the attacks of stormy tides and violent winds, and the ice is carried off into the open sea.

The mouth of the Penshina remained clear during my entire stay at Kamenskoye. Each incoming tide brought in the ice-floes, which, breaking against the rocky shore, were turned into a mass of ice, or left upon the rocks. All these circumstances — the open sea, the instability of the ice along the coast, and the floating ice in the open — affect unfavorably the sea-hunting of the Koryak. During the winter, when the Chukchee and Eskimo hunt seals under the ice, the Maritime Koryak cannot have fresh provisions from the sea, but are dependent upon their summer and fall supplies. 132 225

On the other hand, since the sea is not ice-bound, navigation in the Okhotsk Sea begins early in spring. According to Slunin,[1] American whaling-schooners appear in Penshina Bay as early as April, casting anchor near the Itkana settlement on the Taigonos Peninsula and in Ma'meč Bay in Kamchatka, where they find shelter from the strong winds. The first Russian steamers, however, do not sail from Vladivostok for the ports of the far north before the end of May, since, even as late as June, drifting ice is to be found in Baron Korff's Bay, near Okhotsk, and even near the Shantar Islands, situated to the north of the mouth of the Amur River, whither they are carried by the cold currents. The cold current from Bering Sea hugs the eastern shores of Kamchatka, while two cold currents are observed in Okhotsk Sea, — one, from Gishiga Bay toward the southeastern shores of Okhotsk Sea; another, in the northern part of Penshina Bay, passing along the western shore of Kamchatka toward the Kurile Islands. 505 132

The presence of ice far into summer, which absorbs most of the heat of the long summer days prevailing in that latitude, does not give the sea-water a chance to get warm, and to moderate the night temperature of the 132

---

[1] Slunin, I, p. 259.

1: Jochelson E-5 (1900-01) 1908 RY4 Koryak RY4

132 shores. Owing to the constant cold fogs in the beginning of summer and the heat-energy expended in melting the snow, the earth gets but little heated. More or less clear and comparatively warm days come not earlier than at the end of July and beginning of August. The soil, however, thaws out only to an inconsiderable depth.

[251] Regular observations with reference to this matter have hardly been carried on as yet, but all over that region the natives utilize a hole in the ever-frozen soil as a cellar in which to preserve their provisions. Slunin found a frozen layer of soil in the Gishiga tundra at a depth of 0.9 metres, and on the Stolbovoi tundra at a depth of from 0.36 to 0.54 metres.[1] Dittmar found in summer, near Gishiginsk, a thick layer of fossil ice at a depth of from 45 cm. to 60 cm.[2] On the Sedanke River he found the frozen soil at a depth of from 60 cm. to 90 cm.[3]

On the northern slopes of even very small heights, in gorges, or in rocky bays, the ice-glazed snow, hardened by the winds, melts only toward the end of August. The moist, moss-covered turf-layer of the tundra is another means by which the heat is prevented from penetrating deep into the soil. The rain-water and the water from the melting snow, which evaporates but very slightly, unable to penetrate the frozen soil, stagnate on the surface of the plain, forming extensive swamps, and rendering all communi-
[177] cation difficult or impossible during summer. Thus, from the beginning of May until the middle or end of October, the Russian settlement of Gishiginsk, as well as other settlements, is completely cut off from the Koryak villages and camps.

492 Communication between points situated at a short distance from one
484 another is carried on by the Koryak on foot, and by the Tungus by riding
179 their reindeer. The animals best adapted for use in moving from place to place in that swampy region would be pack-horses; but there are very few horses available, particularly in the Gishiga district. The Russian inhabitants of Gishiginsk owned in 1901 only about sixty-five horses, brought thither at different times from the Yakutsk Province. Though these horses are very hardy, they cannot long endure the journeying through the swamps, but wear out quickly, since they have only the scant green fodder upon which to depend. The Russians use them only for short-distance riding between their own settlements along the Gishiga River, or from the settlement Gishiginsk to the Tungus fairs on the Varkhalan and Nayakhan Rivers; and seldom during summer does a Russian merchant venture even to the nearest Koryak villages.

For getting over from Gishiga to Paren (Poitin) in the fall of 1900, I

[1] See Slunin, I, p. 250.
[2] See Dittmar, Reisen in Kamtschatka, pp. 427, 431.
[3] Ibid., p. 483.